Pyrotechnics

The Now & Then Newsletter
of General Technics

Issue # 48

Get That #*@&#*!!! Dinosaur off My Foot!

Christopher Dunn

How does one explain a job like playing caretaker for a bunch of robotic dinosaurs? Darned if I know, but here goes... The following being a some-what compressed time span of about 4 months.

I work for this museum, you see, the Chicago Academy of Sciences to be exact, down in Lincoln Park, by the zoo. I'm kind of the chief technical person, everything from wiring the exhibits—to programming the computers—to hanging over the top of 40-story Loop buildings mounting TV cameras to document peregrine falcons nesting. Needless to say, you wind up doing some interesting stuff when you are a staff of 1. And just about the strangest thing I have done for the Academy is to play nursemaid for a bunch of robotic dinosaurs.

Three years ago the Academy decided to try out a new exhibit program, a "Blockbuster" summer exhibit of dinosaurs. These creatures, some full-size, some scaled down to a manageable size, were to be rented from a California company and put on exhibit at the Academy. These "Dinos" had been making the tour of the country at various science museums and the like, but had never been in the Chicago region before.

OK, first problem: Where to put the buggers? If you have ever been to the Academy, you will know that every square foot of space in the building is already jam-packed. No room inside at all. Hmmm... Then we go outside the building. Outside? Sure, let's put up a big tent. And that's exactly what we did. An 80-foot by 100-foot tent went up next to the building.

Now Chris... put power and lights in the tent.

Don't get me wrong, folks, I don't mind 5-volt TTL logic circuits, or 12 VDC motors, or even 110 VAC air conditioners, but I am not set up for 200-amp 220-volt AC. Frantic trip to let my fingers do the walking through the yellow pages time!

After running through about two dozen electricians, we finally get someone at a reasonable price to drop a temporary line from our supply in the building to the tent. Now, just to make everything legal, all the wiring in the tent is run as plug in extension cords. I then got the honor of creating a few dozen 12- and 14-gauge wire extension cords. Fun mounting plugs and outlets on the ends of the cable, and running them along the rafters of the tent to the required locations. Ok... Electricity fairly under control, what next? Air.

Air? Yes, air. The dinos are pneumatically operated; they need compressed air. ARGH... I don't know beans about compressors...

Back to the yellow pages. I very quickly became indoctrinated in PSI's, CFM's, air driers, hose sizes and quick connects. The big question is: Just how big of a compressor do we need to run all 10 or so creatures that are coming? Well, the spec sheets for each creature are somewhat vague about this. (These are also the sheets that say each dino needs 15 amps of electricity each! This seems somewhat high to me... It was; each only pulled 3 or 4 amps. Spec writer should have said 15-amp outlet.)

I finally get one air supply company who is willing to help with this mess, and we decide we need a 15-horsepower compressor to do this job. Problem is now, it requires 3-phase electricity, and we only have 2-phase in the tent. OK... We put the compressor in the electrical room in the building, and then run this BIG air hose out the side of the building, overhead next to the power line, then down into the tent. Natch! Got it. Ah, but wait, we forgot about the air drier. Air Drier? Sure, says here we need an air drier. What's it do? Refrigerates the air, takes the water out of it. Oh! OK, where does that go?

We put that here next to the compressor. OK. Can I plug it into this outlet? No. It's 220V single phase. Oh. Nuts... Looking around for a quick source of 220. Eye falls on boiler in next room. Hey... we won't need the

boiler hooked up during the summer, and it's 220... Run line from boiler to air drier.

Now, you might ask, what about the dinosaurs????? Well, here is the dope...

You take the latest data on what scientists think the creatures look like, and you build an aluminum and steel framework to sort of match their bone structure. You install some joints and hinges in various places and connect some pneumatic cylinders in there. Run the air hoses down into the base where you connect them to 24V solenoid valves. Take a fair amount of foam rubber, nylon cloth, latex, and plastics of various sorts and form it around the frame in the shape of your intended dinosaur. Apply some airbrush paint of colors that scientists can only guess at, and you have a dinosaur almost ready to go.

Hook your solenoid valves to a simple PROM sequencer (in the old models), or a programmable sequencer (in the new models) and make that open and close the valves in some abstract order so as to produce the most fright from little children. Oh yeah, get a digitized sound player, and have it go off when the solenoid that opens the creatures mouth fires. Have it play some horrible rumble that the scientists are still guessing at too.

Now you have a dinosaur like the ones that rolled off the three large 18-wheelers at the tent one spring morning.

Ah, but you see, my story is not quite done, for getting them off the truck (a half dozen guys with pry bars...), rolling them into place (not too hard, except when the caster wheels go through the plywood floor...), and hooking them up (power and air...), was only half the fun!

I had to now fix the little things that got damaged in transit, or simply wore out at their previous show. The company that built the creatures does send out a tech for the opening of any new show, but there is always something that goes wrong when he is not around. Truth be told, there is not all that much to the mechanical workings of the beasties, but there are adjustments and such that need to be done every so often. So I got a crash course in pneumatic control. Little valves and regulators that controlled the limit and speed of the movements of arms, legs, mouths, heads, bodies, and eyes. You don't want them whipping around too fast, they might shake something loose. (Some did!) Or too slow. (No fun!)

I took care of things like loose connections to control boxes, broken wires, loose pc boards, etc. Our Exhibits Department staff took care of skin repairs and touch-up painting. (Lots of foam rubber and glue used there, folks!) And we left the heavy mechanical failures to the company techs. (What do you mean the thrust bearing pushed through the top of the Triceratops head? Do you have a welding torch?)

To make a long story just a little longer, we got all the dinos up and running in time for opening day, and that summer we had the most people go through the Academy in its history. There were little glitches along the way... Chris... all the dinos have stopped... Turned out to be a stuck valve on the compressor. Really got greasy fixing that one. Or... Chris... This dino won't move... Well, did you try turning it on ?

You know, stuff like that.

The show was so successful, we have had more robotic shows like the dinos, only with prehistoric mammals the next year, and sea monsters the year after that. Lots of running around, lots of stringing wires and air hoses, lots of catering to those *@#&&#!! DINOSAURS!

At Your Fingertips

Moshe Yudkowsky

Modern hotels have gone high tech. You now need instructions on how to use all the amenities included in your room: the TV, the telephone, the microwave, and what have you. Let's think ahead to Chicon XCV, and take a glance at guest information pamphlets:

Welcome to the Sheraton-Hyatt-Ambassador-Marriott Hotel. Your hotel room is equipped with the most modern suite of controls available today. To make your stay as pleasant as possible, please pay careful attention to these instructions. Our friendly SHAM staff will be glad to assist you if you have any questions.

To change a setting, use the keypad, or touch the appropriate control and speak your request.

LIGHTING: The intensity and spectrum of your room lighting may be adjusted over a wide range. Our standard catalog includes natural (Sol-type) lighting, with a selection of other type stars available, from blue giant to red dwarf. Selectable filtering can emulate any combination of atmospheres, from (Earth) standard to (literally) sapphire skies.

LIGHT: This controls the speed of light in your room, from 0.01% of normal, all the way to 500% of normal. The LIGHTING intensity control will automatically adjust the intensity of the light, but will not automatically compensate for changed colors, which will redden as the speed of light decreases. PLEASE exercise caution when using this feature, as several guests have been sunburnt by the shining faces of their fellow guests.

GRAVITY: Two controls, one for intensity (from 0 to 2 g) and the other for direction. When using this feature, please exercise caution when entering or leaving your room. The bathroom will always retain a minimum 0.1 g setting in the downward direction only. Note: In accordance with fire-department regulations, the light-colored area around the front door is a transition zone between normal gravity and room settings. In the event of a fire alarm or power failure, the gravity will slowly return to normal. Health department regulations require us to tell you that interfering with the direction and intensity indicators is strictly prohibited.

TIME: The rate at which time passes may be varied over 1% to 1000% of normal. IMPORTANT: While we pride ourselves on our prompt room service, please remember that a 10 minute wait at normal (100%) rates translates to over 16 hours at 1%. Please order in advance to secure your meals on time! PLEASE NOTE: Adjusting time below 80% will incur a surcharge, since it requires increased airflow to your room, increased utilities usage, etc.

Quarks

• *Son of GT Songbook:* In 1979, Mary Lynn Johnson and friends published *They Don't Write 'Em Like That, Yet,* an illustrated compilation of favorite GT filksongs. Thanks to the herculean typing efforts of Audrey Helou, the General Technics Songbook is being given a new chance for a comeback. (Come to think of it, we're not even sure if Hercules *could* type. But we know Audrey can.) We'll have all-new typesetting, new illos, new printshop and hopefully, some new songs. Now's the time to get those songs sent in for inclusion. You won't believe some of the drawings Paul MacNerland has done for it already! Fabulous!

• It's interesting to see that committees for the World Science Fiction Conventions are using electronic mail networks. Maybe someday the Worldcon will be conducted in a virtual-reality hotel, and we can all attend in the comfort of our homes. We need to figure out how to give each other cyberspace backrubs first, though.

Chicon's (the 1991 Worldcon) electronic mail addresses:

73016.1363@compuserve.com [on Internet]
[73016,1363] [on CompuServe]

MagiCon (1992 in Orlando) can be reached at:

73747.2622@compuserve.com [on Internet]
[73747,2622] [on CompuServe] D.RATTI [on GEnie]

ConFrancisco's (1993) e-mail goes to:

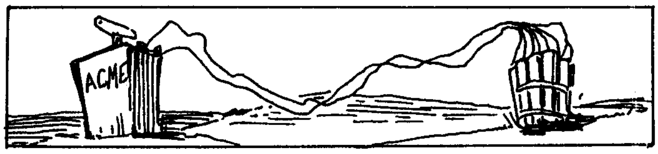
confrancisco@tgv.com
or 72377.3623@compuserve.com [on Internet]
[72377,3623] [on CompuServe]

• Chris and Cecile Cloutier materialized at Minicon; they're living in Minneapolis, where Chris works as a law librarian. (We're hoping *Pyro* will soon see cartoons from the Cloutiers once more, as in the Old Days). Cecile is traffic manager at an AM radio station whose format is 100% childrens' music. Apparently the "Boomers' Echo," the current generation of youngsters, is a niche market for a burgeoning kidsong industry. A carload of Chicagoans who sampled the station on the way home from the con reports that it was pleasant listening, and there were even one or two songs they wouldn't mind hearing again.

• Friends and family of Amy Bollinger and Tullio Proni converged on Kalamazoo for a wedding on the weekend of 25th of May. The couple made their vows both in English and Italian, Amy looking rather like Glinda the Good with her elaborate gown and magic wand. (The wand was a standard Isher Enterprises conductivity-switch model. Taking hold of its top end, the groom kissed the bride. This completed the circuit and lit the "magic crystal" on the end, much to the delight of the congregation.) Later, guests thronged the House of Isher; for once, the noise didn't come from the famous machine shop. Guy Wicker provided an, er, illuminating demonstration of pyrotechnics (small p, small t, no italics) after darkness fell.

• Premature Demise Department: Not long ago, Mary Lynn heard from the Social Security Administration of the Government of the United States of America. She was very surprised to find that, according to the SSA, she had been dead for seventeen years. What's more, they've been investigating the anomaly for *three* years, and have only now gotten around to contacting *her.* Apparently when benefits she was receiving ran out, instead of punching the "Stop Paying These Benefits" column on the Hollerith card, some clerk hit the "Dead" column instead.

Mary Lynn got lots of mileage out of being dead; it made her a minor celebrity around here. She came to work grinning and told her manager, "I'm proof that there's an afterlife!" "Honey," the manager replied without missing a beat, "you must have been *very* bad, 'cause you're still working *here...*"



August Berserker News Update

Mary Lynn Johnson

Once again the camping berserker is coming our way and is slated to be held Aug. 1-4, 1991 at McLain State Park. For information pertaining to getting a campsite (they're going fast...) you can write to McLain State Park, Highway M-203, Hancock, Mich., 49930 or call them at (906)482-0278. Sites are $10.00 a nite with a $4.00 reservation fee. Then there's $3.00 a day to bring your car into the campground unless you want to buy the all-year sticker for $15.00. There are also restrictions as to how many people, tents, and cars you can have on one site, so get in touch with them for further details.

Guy Wicker is once again Meister for this event with some new activities planned. There might be a trip to Isle Royal, model rocketry, kites, hydrogen balloons, fireworks on the beach, and a special display by John McKana entitled "Baghdad."

Guy Wicker has requested that potential attendees notify him if they are coming. RSVPs can be sent to him at: Guy Wicker, 30437 Fairfax, Southfield, Michigan, 408076. Or phone: (313)647-1820.

Editorial

Mary Lynn S. Johnson

I have decided to update you all a bit on just how *PyroTechnics* is doing and what our plans for its future are. To do this, first let me outline briefly just how mail for an issue is handled on this end.

All mail is now sent to the *Pyro* P.O. Box in Aurora. This has distinct advantages in that not only does the address change less frequently but it's also much easier to remember. Additionally, the post office is a lot kinder to the large packages we recieve.

I pick up the mail on an average of twice a week. Then I log them all in a computer file I keep so that should a catastrophic error occur in the mailing lists, we have a backup. Then the requests for samples or back issues are packaged and sent out.

Samples and back issues have proven to be a very successful pursuit. Not only do they introduce new folks to our newsletter, but they also help us cover postage and printing on the oversized mailings. *Pyro* pays for its own postage, PO Box, photocopies, layout wax, labels, stapler and yes, even staples. We've been able to reprint the first issue and work has begun on making Issue Two available. *Pyro* has proven that it can easily handle its own expenses. This does not mean that we're making a profit. It just means that the whole thing has been set up to be self-supporting. This has allowed us to absorb the recent postage increase without raising subscription rates. Rates for back issues and samples did go up, however.

Subscriptions received are logged in, then the checks are sent on to Connie Trembley. Again, she keeps duplicate records so nothing gets lost. A list of the new subscriptions and renewals is sent to Dave Ifversen for integrating into the mailing list. In the past, we had some problems with information getting lost. Dave eliminated a lot of this by creating his own program for the mailing list. The way things are set up now, I can trace one person's activity with *Pyro* from beginning to end to aid in sorting out problems. So far, everything is working very well indeed.

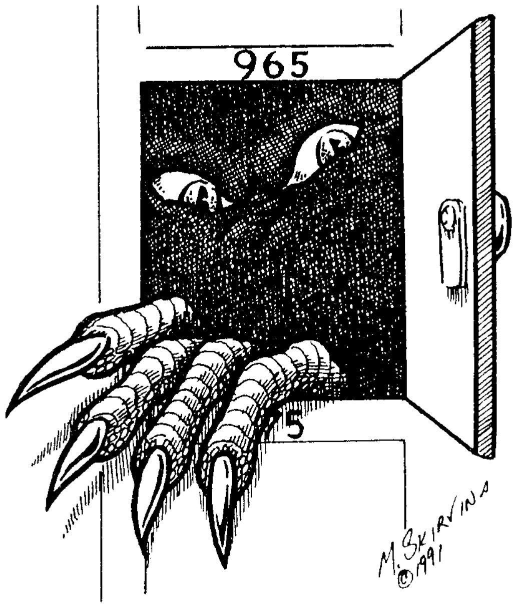
Articles and disks that I recieve by mail are sent on to Bill and Barry for formatting and editing. Bill Leininger and Sam Paris have also worked in this capacity when time gets tight. Deadlines are very hard to keep around here and many are the times that these guys have exibited superhuman (well, nearly) effort to get things done on schedule (well, nearly). Remember, *Pyro* is not a personalzine. It is a club newsletter. It relies heavily not only on contributions from its readers but also on the *Pyro* staff for squeezing time out of sometimes impossible life/work schedules in order to attend the editing meetings.

This brings me to some of the more current news. Aside from having a good healthy bank account, *Pyro* has also achieved a real first. Both Issues 46 and 47 were printed in offset! The big Kodak copier we were using to produce *Pyro* was sold, so we moved our operations to Wally's Kwik Kopy in Aurora. Not only do we get the same great price but we also get offset. Kwik Kopy has given us tremendous service in the past and I'm very happy with the business relationship we have with them.

In addition to going offset, *Pyro* has also been offered another deal by Ted Hueckstaedt, who is a pressman by trade. He has offered to print *Pyro* at even cheaper rates and also add in the luxury of being printed on 11 × 17 paper. Our issues could then afford to be not only larger but niftier-looking. 11 × 17 paper would be folded in half and saddle-stapled for an $8\frac{1}{2} \times 11$ magazine format. The downside to all this is that we aren't getting the volume of articles needed to justify all the bells and whistles.

The problem with some folks is that they feel that they should save the articles they write for submission to magazines who will pay for them. I currently believe that running an article in *Pyro* is not a substantive deterrent to still sending the article on to a larger publication. Our subscriber base is not likely to be a threat to the theory of pre-publication.

Because of the somewhat low participation rate, I think we're going to drop the business of deadlines for issues. At first, I thought it would give everyone a sense of purpose and structure. But it has proven to be virtually impossible to adhere to. The number of subscribers is high (compared to the past) and renewal rate is very good. We just need to participate more. For now though, our subtitle will become literal: *The Now And Then Newsletter of General Technics.* The subscription cost doesn't change, nor the number of issues in a subscription. Just the rate at which they come out. We'll print issues at the same rate that material is available to print. Bear in mind that we haven't gotten tired of working on *Pyro* yet. Not at all. We've made it through nine issues so far, so it's not likely that *Pyro* will fold in the near future. That means that if you get to wondering where your next issue of *Pyro* is because you haven't gotten one in awhile, ask yourself if you've written anything for it lately. That's what I'll ask you if you write to me wanting to know what happened. Simple enough.



Another problem is "What do I write about?" Since good build-it-yourself articles are very hard to come by, we decided long ago to widen our borders to all branches of science both hard and soft. We'd like to see articles from archaeologists, astronomers, botanists, zoologists, chemists, geologists and so on and so on. Just talk about what you're interested in whether you're an amateur or a professional. Another tack might be to just write about some of your experiences as a science/science-fiction enthusiast. How about book or movie reviews? Caught any glaring technical errors in them lately? Have you been to a neat museum or science facility lately? Have you been on any tours or visits to such places? How about things you've built? You don't have to submit a diagram of it if you don't want to but it would sure be interesting to hear about what you're up to. Tell us about cool places that techies really should make a point to visit when we're in town. Tell us about some of the juicy catalogs you've gotten and whether or not you've had good service from them. How about Dr. Techie questions? Try to stump us, we *dare* you. If we can't answer it, we'll throw it open and see if any of the readers can enlighten us. You'd be surprised at how many people would be interested in hearing you chat up your favorite subjects for awhile. We've gotten several great stories already and I'm sure there are more out there.

The next thing I'd like to cover is the 50th issue. Because of all the neat deals we've been able to cut for printing, we wanted to make Issue Fifty a real big one. Hopes for this are fading fast, since we have not gotten enough material for it yet. We had hoped to fill it with the exploits of all our readers in a fashion similar to that of the *Legends of CalTech* book (reviewed in Issue 47). It can still happen, though, if we get the material in time. We've gotten a few really wonderful items so far and if that is any indication of what #50 will be like, we're in for a real knockout of an issue! There's even a possibility of having Amy Bollinger do a hand-set type cover. Talk about about outdoing the other amateur publications! But we need both time and justification for such extraordinary efforts.

Finally, I'd like to mention that since we had virtually no responses to the subject of restructuring of General Technics, we will remain the somewhat nebulous group that we are for the time being. There currently are no criteria for being a member of GT either now or in the future. Those of us who still call ourselves "members" are doing so because we were once and still consider ourselves to be. We aren't going to exclude new people because of it.

Just A Little Atrial Fibrillation...

Barry Gehm

Mary Lynn has nicely summarized the current state of *Pyro*, which is, by and large, pretty good. Our subscription roster is comfortably large, our finances in good order, and our printing resources more than satisfactory. From a "business" standpoint, *Pyro* is in excellent shape. However, as Mary Lynn relates in her editorial, *Pyro* is reverting to a "Now & Then" schedule of publication, instead of the regular quarterly schedule we have been attempting to follow.

This decision was not made without trepidation on the part of the editorial board. Maintaining a regular schedule had been a point of pride with us; furthermore, the transition from regular to irregular publication has preceded the demise of some previous *Pyro* editorships. *Pyro* seems generally healthy, but we've heard that ominous cough before.

Some of the problems originate in the editorial board. All of us have other responsibilities, real-life and fannish, and the latter are currently expanding as Chicon V approaches. But that is a temporary problem, and such difficulties are manageable. The current editorship of *Pyro* was set up as a partnership of several people in order to alleviate such difficulties.

But there is another obstacle to regular publication that is beyond the capacity of the editorial board alone to overcome: we simply are not getting enough submissions to fill the issues. This problem is more intractable. Even if it were possible for the editorial board to take up the slack by filling each issue with their own writings, such a solution would be contrary to the spirit and purpose of *Pyro*. The wording of the masthead may change from "Now & Then" to "Quarterly" and back again, but the rest of the phrase remains constant: "The Newsletter of General Technics." *Pyro* exists to provide a medium of communication for Techies. As long as we have something to say to each other it should flourish; if the time comes that we don't it will die. Has that time come?

I find it hard to believe. I get to meet a lot of you at conventions, berzerkers, and other fannish functions, and damn few of you are boring. The conversations at these get-togethers are peppered with amazing stories (to borrow a phrase from Hugo Gernsback), contentious opinions and the occasional learned discourse. Much of the news, views and gossip that gets passed around at these events would be of interest to the many readers of *Pyro* that can't attend (and I'd like to hear what people are saying at the ones *I* can't get to). You just have to write 'em down and send 'em in, folks.

A handful of Techies have been faithful contributors in the past couple years; we thank them deeply, and hope they will keep it up. A number of old hands whose writings and art used to appear regularly in days of yore have not been heard from of late; we hope they will get up off their, uh, laurels and contribute (especially old techie stories for Issue 50!). Even more we hope that some of our many recent subscribers will take up the challenge and send us something. Think of it as an initiation rite into GT. Hey, it beats ritual scarification with a soldering iron -- but let's save the stories about the old days for Issue 50.

Anything Goes

by Fred Robinson

Whitewings paper airplanes

The paper airplane is an object near and dear to any schoolchild's heart. The traditional paper dart has aggravated more teachers than you can shake a stick at (which is not the best thing to do in any case). But once one "matures", one's paper aviation generally deteriorates to a bit of office tomfoolery involving the cubicle walls.

If you can be trusted with a razor knife, however, there is salvation. Dr. Yasuaki Ninomiya, a retired communications engineer and researcher with a lifelong fascination with airplanes, has produced four collections of cut-'em-out-and-glue-'em-together-yourself paper planes, collectively called **Whitewings**. These gliders are a far cry from the old folded paper plane.

There are fifteen gliders in each collection, printed on sheets of heavy paper. The pages are arranged so that the simpler gliders are assembled first. As one gains experience with the techniques involved, the more complex ones become less daunting. Most planes are based on a seven-layer laminated fuselage, which results in a sturdy plane which can take a reasonable amount of punishment.

Each set comes with a highly detailed instruction booklet. This book provides general construction tips as well as construction steps for each plane. Also included are sections on tuning the completed planes' flight patterns and a basic course on paper plane design. This last is not essential to building the planes, but it does give insight into why the planes fly the way they do.

The collections are dubbed "Original", "Collection", "Heritage", and "Future of Flight". The planes in each set reflect the set's name, more or less. The Original series starts with seven members of the "Racer 500" class. The Racer 500s are based on the same general design, similar to a standard sailplane, with variation between them to make each one unique. For instance, the 504 *Dolphin* and 506 *White Panther* have vertical stabilizers positioned on the underside of the fuselage rather than above. For instance again, the wing tips on the 505 *Hi-wing*, 506 *White Panther*, and 507 *Grace* are bent up from the horizontal wing.

Once past the Racers, there comes a tailless plane, a miniature SST, three military types (Jet Trainer, F-15 Eagle, and P-51D Mustang), a flying boat, a biplane, and a model of NX-211, "The Spirit of St. Louis". The flying boat is unique amongst all four sets in that it is the only plane with a propeller! Granted, it doesn't provide any thrust, but it is free-wheeling and will spin when the plane is flown.

The Collection series planes are mostly named after birds.

There are seven more Racer 500 planes, again with variations from the basic design. There are also four "Light Plane 300" class planes, which resemble the kind of plane you might see at small airports. Finally, there is a very small Jumbo jet, a Lockheed Vega dubbed "Winnie Mae", a General Dynamics F-16 Falcon, and an extremely reasonable approximation of the Wright *Flyer*. Given that the wingspan on the *Flyer* model is about seven inches, the likeness is very good.

Things become a bit more esoteric with the Heritage series. Most of these planes are named after prominent figures in aviation history, such as Wilbur & Orville Wright, "Pappy" Boyington, Amelia Erhardt, Charles Lindburgh, Eddie Rickenbacher, etc. There are five new Racer 500s (although by now they are starting to all look alike), as well as two more Light Plane 300s (one each for the Wrights). Next comes a McDonnell-Douglas Phantom II, a Lockheed Constellation and C-130 Hercules, and the modified P-51 Mustang known as "Strega". Last, there is a model of Rutan's *Voyager*, which is not quite accurate since the real thing lost its wing-tip winglets on take-off!

The stars of the Heritage series (at least, the largest planes so far) are the three "TriLinear 700" class planes. These are based on a hollow fuselage with a skinny triangular cross section. This gives high strength combined with the necessary low mass. Each of these planes is roughly twice as long as any other in this collection.

The Future of Flight series leaves the esoteric for the downright bizarre. There are three more bird-named Racer 500s, just to get you warmed up. After that, Dr. Ninomiya starts to have fun. There's another tailless plane, and a Delta plane with a triangular wing. A canard plane, with the horizontal stabilizer up front. Planes with circular, ring-shaped, and obliquely-mounted wings. A plane that drops a smaller plane in mid-flight. Three more TriLinears (smaller this time): One with five wings, one with a horizontal stabilizer the same size as the wing, and one with asymmetric wings. A passenger plane which provides each passenger with a window seat. And finally, a model of the Northrop B-2 "Stealth" bomber, but in white rather than black.

In all, there are enough planes here to keep you busy cutting and gluing for most of a winter, if the glue fumes don't get you. It takes about six to eight hours or so to finish a typical plane. Most of this time, though, is spent waiting for the glue to dry. Cutting out the parts can be done with scissors and a razor knife, and goes fairly quickly. The hardest part is keeping your hands off the parts while the glue is drying. To do a good job requires patience, steady hands, good light, sharp tools, and more patience.

Even though I said the planes are strong, they are still made of paper. They can be damaged rather easily. To cover this possibility, Dr. Ninomiya recommends coating the finished planes with a clear lacquer or enamel to waterproof them. He also provides tips on repair, as well as suggesting a plan for a carrying box.

Dr. Ninomiya is the author of the eight-volume "Collection of High Performance Paper Planes" which has sold over three million copies. He holds a private pilot's license and flies his Cessna 182 whenever he can get away with it. He took the grand prizes in the Distance Flight and Duration Flight categories at the First International Paper Plane Contest in 1967. In the back of the Collection series booklet, there is a photo of him in what appears to be a study. The ceiling is literally covered with paper planes!

In addition to these do-it-yourself **Whitewings** collections, there are also **Whitewings** planes made of balsa wood, high-fiber laminate, and/or styrene. Naturally, these planes are sturdier than the paper versions, but I think you get a sense of accomplishment when you put one of paper planes together, nicht?

Whitewings paper airplanes

Original series	AG1500
Collection series	AG1501
Heritage series	AG1502
Future of Flight series	AG1503

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All four collections are available (at $16.00 each plus S&H) from Into The Wind, 1408 Pearl St., Boulder, CO 80302. Into The Wind primarily sells kites and kite-related equipment. They also carry a goodly selection of non-kite but still flight-related stuff like boomerangs.

QUEST FOR THE BLUE UNICORN: Part Two

Clyde R. Jones

Well, it's not red. It's not amber. It's not yellow. And it's not really green. It's blue. But is it blue enough, yet?

Since our last installment a few things have changed in the world of the Blue Blinkie. The main item is that they are now really and truly commercially available, and the prices are starting to come down.

This months issue of *Electronic Products Guide* listed a new company in the Blue Blinkie game, well known Industrial Devices Inc. It's a LARGE producer of all sorts of electronical bits. They have an excellent catalog with lots of LEDs and information on their manufacture and operation. Upon telephone request, they will cheerfully send you a nifty catalog which actually has blue LEDs listed in it like real components. They list two sizes of naked LEDs, two types of on-board LEDs in plastic mounts using the T-1 size LED, and two Snap-in Panel Indicators. Their basic naked LEDs are a T-1 3/4 blue diffused item with about 3 mcd output, and a clear T-1 unit running at 1.8 mcd.

They also send you a Free Sample Request Card and a special order form allowing you to order sets of blue LEDs at the 1000-piece price break - **2 for $10** for naked LEDs. This is about a third the price from anyone else in small quantities. Their Onsie/Twosie price is around **$10 each**, which still makes them cheaper than anyone else by about 33%. Congratulations to IDI! The 2-for-a-Tenspot deal may also be available from distributors who handle IDI products. Nice thought.

CREE RESEARCH actually *did* send me a free sample of their diffused blue LED. It is nice and visible in its very slightly diffused bubble of epoxy. I don't know if CREE will begin dropping their prices now that IDI is pushing theirs for a Tenspot, but it's a hope. Once they make back a hefty investment in research and development in their proprietary BLUE LED technology, their price should drop *a lot.*

LEDTRONICS is now advertising a "true R/G/B LED" in a rather large 8mm diameter package. Each color die is separately addressable with individual anodes, and the package has a common cathode. Separate access to the die is a good idea, since the blue chip takes a higher voltage and milliAmperage than the red and green ones. Now, this is an interesting idea, allowing the interested techie to produce "almost any color" from one little (well, not so little) LED. But is it truly available for use by mere mortals? Ledtronics talks a lot but has sent nothing in the way of *framples* (free samples) or offers to actually *sell* these things to me. Perhaps they are advertising what they don't have, just to keep up with the other players in the game? Who knows?

All the LEDs on the market seem pretty close in basic characteristics. The larger T-1 3/4 (5mm dia.) sizes usually put out 3 to 5 mcd (millicandella) at a rather high 45 milliAmps at typically 3.5 volts. Pulsing them at 300 PPM you should be able to shove 115 mA through them without having them shatter or blow up.

The T-1 (3mm dia.) ones typically put out 1.3 mcd at 30 mA at 3.5 volts and have the same pulsing characteristics. The lower continuous power level is probably due to the physically smaller package which can dissipate less heat.

Only the large blue LED from IDI is listed as coming in a *blue* diffused epoxy package. The others are water clear, or clear/diffused. (LED packages can be either *Clear* or *Tinted* referring to the actual color of the epoxy, and *Clear* or *Diffused* referring to whether the epoxy is completely transparent, or slightly translucent/diffused. Yeah, it's a little confusing.)

And the color... LEDs put out "monochromatic light" it says here in my guide book. That means "one color" light. A *red* LED crystal - the little flake of Gallium Arsenide or Gallium Arsenide Phosphide that actually produces light when goosed by an electric current - puts out only *red* light. Due to the problem real nature has in putting up with the demands of quantum physics, the photon production process within the crystal does not put out only one exact wavelength of light as quantum hackers tell us it should. It produces a small bandwidth or range of frequencies centered around one Peak Frequency. Usually this range of frequencies is quite narrow, so it seems that the LED is putting out only one color of light. It *seems* to be monochromatic, because the frequency smear is not too large.

Blue LEDs have a very *wide* frequency smear, or a very wide spectral output. The main frequency is 470 nm (nanometer) deep *blue* which is where its maximum power is measured. The other colors or frequencies of light it produces drop off sharply from this peak, or should. The sub-frequency or color where the intensity is only 50% of the intensity of the main frequency is the Half Peak Power point. this gives you a good idea of how "pure" a produced color is. A typical *red* LED crystal puts out a sharp Peak at one frequency and has a HPP point still well within the *red* range of colours.

A *blue* LED is a bit different. Toward the RED end of the spectrum, a *blue* LED's Half Peak Power point is well into medium *green*. The other way, it's well into *ultra-violet*! The resulting visible color is a blend that seems blue/white. This can be filtered to produce a very pure *blue* light, but you lose a lot of the intensity provided by all those sub-frequencies. So, do you want it *Deep Blue*, or Kind Of Bright?

(Personally, I find that the wide smear of frequencies in the *blue* LED calls into question the whole of "quantum physics" but that is a whole 'nother subject.)

What are the colours of LEDs related to frequencies in nm or nanometers? One manufacturer lists them this way:

DEEP RED	695nm
SUPER RED	660nm
ORANGE/RED	635nm
AMBER	610nm
YELLOW	585nm
GREEN	565nm
PURE GREEN	555nm
TRUE BLUE	470nm

For a rather good discussion of LEDs, their manufacturing and characteristics, ask LUMEX for their *LUMEX-LITES* catalog. No, they don't have blue LEDs listed yet, but they list more ways to make them then anyone else. (Gallium Nitride? Zinc Sulfite? Zinc Selenide?) IDI also has a good discussion in their catalog.

BLUE BLINKIES are here, and commercially available. The prices are coming down to where buying a few doesn't wreck the budget. Now, let's see what we can do with the silly things!

((As an aside, TOSHIBA has demonstrated a *100 mW* VISIBLE RED LASER DIODE. Now *there's* a nice part for laser pistols, when they get them into production. Hey, Tulio? Wanna see my PPTP -- Personal Pave Tack Pod?))

SOURCES OF ALL THIS GOOD STUFF

CREE RESEARCH, INC., 2810 MERIDIAN PARKWAY, SUITE 176, DURHAM N.C. 27713, PHONE 1-800-LED-BLUE (cute, that) ask for Janet Lewis or Mr. Hunter, FAX (919) 361-4630, CREE has a wide variety of LEDs and discrete DICE. They sell the discrete dice for as little as $0.75 in quantity. They will send *free samples* with their Sample Request Card, which you get when you ask for spec sheets. They are nice folks.

MARKTECH INTERNATIONAL CORP., 5 HEMLOCK STREET, LATHAM, NY 12110, PHONE (518) 786-6591, FAX (518) 786-6599, $15 for clear or diffused T-1 3/4 units in single quantities, shipping *right now.* CREE makes their BLUE LEDs and DICE.

INDUSTRIAL DEVICES INC., 260 RAILROAD AVENUE, HACKENSACK, N.J. 07601, PHONE (201) 489-8989, FAX (201) 489-6911 Shipping NOW at least 6 different types and mountings of blue LEDs, *free samples* with literature, and for a limited time 2 blues LEDs for $10 with a special order form (you get them at the 1000+ piece price break).

LEDTRONICS, INC., PHONE (213) 549-9995, FAX (213) 549-4820, Still quoting "preliminary specs" at prices from $15 to $30 for T-1 3/4 units. I have seen no samples OR PARTS of any kind from these people, even though they keep sending me new product announcements for all sorts of LED products including an R/G/B LED.

LUMEX OPTO/COMPONENTS INC., 292 E. HELLEN ROAD, PALATINE, ILLINOIS 60067, PHONE (708) 359-2790, FAX (708) 359-8904 No blues, but they have a good general line of LEDs and some unique packages. Multi-national manufacturer.

CLYDE R. JONES, (708) 244-3875 , P.O. BOX 1099, WAUKEGAN, ILLINOIS 60079-1099 (No, I don't sell BLUE LEDs, but I'll cheerfully *talk* about them.)

EDITOR'S NOTE

Cree Research C470 series blue LEDs are also available from Digi-Key Corp. (701 Brooks Ave S., PO Box 677, Theif River Falls, Minn. 56701) at $9.75 each in single quantities. - MLS/TJ

Semiconductor Serenade

Lee Hart

I enjoyed Clyde's article ("Quest for the Blue Unicorn, *PyroTechnics* #46). I saw my first blue LED in 1978; it used silicon carbide, and was made by General Electric. It had 6V of forward drop, and was so dim you could only see it in a darkened room. I think the parts Clyde has are also *silicon* carbide, not tungsten carbide.

Silicon carbide has other useful properties (besides sanding your woodwork). It remains a semiconductor up to 300 degrees Centigrade. CREE (of blue LED fame) is also building transistors that work in molten solder. Just the thing for Venus!

Lots of other materials make interesting semiconductors. Silicon is used for 99 percent of all semiconductors because it's cheap, and they've figured out how to fabricate very complex structures with it. It operates from -50 to +150 degrees C, which pretty much covers what we find here on Earth. Operating voltages can range from 1 to 2000 volts. Silicon LEDs put out infrared light around 1000 nm; not too useful.

Monocrystalline carbon is very good at high voltages, temperatures, and radiation levels, and the military is spending money to find a way to grow large crystals. But if somebody figures out how to grow 6" diamond wafers, the Pentagon won't be their main market. Diamond LEDs would put out ultraviolet light.

Germanium, the first commercially successful semiconductor, is staging a comeback. Germanium quits above 100 degrees C, but keep working down to cryogenic temperatures. Low temperatures reduce thermal noise, so germanium is used for cooled ultra-sensitive amplifiers.

Germanium has half the bandgap voltage, so circuits work on one half the voltage and dissipate half the power. It's faster than silicon; 25-year-old tunnel diodes switch at sub-nonosecond speeds that silicon still can't match. They've now figured out how to grow germanium transistors on a silicon substrate. This solves the problem of making germanium integrated circuits (the prototypes run on a 1.5v supply voltage, and flip-flops toggle at 8 GHz).

Of course, if you REALLY want high performance devices for your Venus lander, there is another alternative. How would you like an inexpensive, well-developed technology that works at temperatures from cryogenic to red-hot, switches anything from microvolts to megawatts, operates at frequencies past 1 million MHz, and ignores radiation in the bargain? Try vacuum tubes!

I've been reading a data sheet on H-P's 15-candela LED. Roger Sonntag built one into a Proni-blaster-like handgun, with a 6" fresnel lens to further focus the 4-degree beam. At 50mA it makes a 1 to 2-inch diameter spot on the wall over 10 feet away.

I don't know what they cost, or where to get one. But it gives me an idea. There are lots of great new parts coming out that could inspire techies to new feats of science. Ultra-bright and blue LEDs. Superconductors. Oddball integrated circuits. High energy batteries.

In earlier times, I either didn't know stuff like this existed, or didn't know here to get it. My greatest discovery was that manufacturers were only too happy to give away free samples, if you'd only ask. For more expensive items, they often had demo kits or engineering samples at reduced prices.

How about starting a techie buyers' club? We could announce sources of neat new parts, surplus bargains, and where appropriate, collect orders to get reduced prices (or provide a business "front" so manufacturers take us seriously). I already have a business name (TMSI), and good contacts in the electronics industry. If this sounds interesting to other *Pyro* readers, please contact me. I'm at 323 W. 19th St., Holland MI 49423, phone (616)396-5085.

Back Issues

What follows is a list of the available back issues of *Pyro*. You can obtain them by sending the appropriate number of 29-cent stamps listed for each issue. Get them now—because when we run out, it might well be years before we get around to reprinting them.

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#17	5	4
#19	53 (Reprint)	4
#20	38	4
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#24	57	8
#25	32	6
#26	26	6
#27	47	4
#39	23	4
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#41	12	4
#42	12	6
#43	28	6
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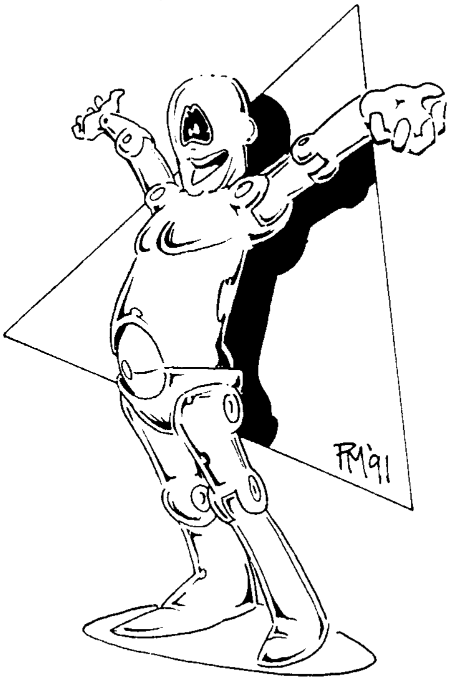
#47	156	6

We also have a small quantity of returned issues that have been munched through the mail system and then sent back because of change of address, improper address, etc. They have additional labels on them, cancellations and numerous rubber stamp marks, but they are free if you request them and send us two 29 cent stamps each for postage to get them to you.



Elvis Hides from Galileo

Bill Higgins

Maybe I should stop reading NASA press releases. I think they're having a bad effect on me...

W. Skeffington Higgins
Headquarters, Washington, D.C.
April 1, 1991
(Phone: 703/555-5609)

RELEASE: 91-48

NASA'S GALILEO PROBE FINDS NO EVIDENCE FOR ELVIS ON EARTH

The Galileo science team today announced that the spacecraft's instruments failed to find any new traces of Elvis Presley during its flyby of Earth last December 8th.

Galileo, a joint project of the National Aeronautics and Space Administration and the European Space Agency, is a two-part spacecraft, consisting of an orbiter and an atmospheric probe, which will explore Jupiter and its satellites when it arrives there in December of 1995. On the way, it has encountered Venus, returned to pass Earth, and will encounter Earth once more at the end of next year.

Prelimnary analysis of the Galileo science data has concentrated on searching for characteristic profiles of the pioneering rock 'n' roll singer.

"It's a tough background subtraction problem," explained Dr. Edward Rock of Caltech. "We know the planet contains several thousand Elvis imitators. You have to distinguish the real thing from many objects of similar appearance."

The method used involved interdisciplinary comparison from several of Galileo's sensors. "For example, an Elvis imitator would have a very similar appearance to Elvis in the SSI [Solid State Imaging] and NIMS [Near Infrared Mapping Spectrometer] data," said Dr. Graham Finale. "But no imitator has Elvis's magnetism." Researchers combined data from Galileo's sensitive magnetometer, mounted on a 36-foot (11-meter) boom, with optical, infrared, and ultraviolet measurements. They are capable of identifying a single genuine Elvis among all the other features of Earth's landscape. This is a very sensitive technique– a feat equivalent to standing in St. Joseph, Missouri, and distinguishing a jellybean in a bowl of amphetamines in Memphis.

Instruments which measure radio emissions also studied the planet during the encounter. "We picked up numerous broadcasts of 'Heartbreak Hotel' and 'All Shook Up,'" Dr. Finale said. "But we were able to corroborate nearly every one with the location of previously known oldies stations."

Galileo investigators were cautious about ruling out the possible existence of Elvis. "We can only set an upper limit," said Dr. Rock. "And we're guessing to some extent at the profile we're looking for. If Elvis has lost weight, for instance, he'd have a different infrared signature." According to the science team, there are 0.21 plus or minus 0.17 Elvises on Earth, a number described as "consistent with zero."

The most widely held theory on Elvis Presley is that he died on August 16, 1977. In the past few years, however, ground-based observers have reported sightings of Presley in such locations as Kalamazoo, Michigan. Since then scientists have been interested in more precise measurements of "The King."

Though speculation has been published in some journals that evidence for Elvis might exist on other planets and moons in our solar system, most scientists agree that Earth is the most likely place to find him. "If, as the new results suggest, there's no Elvis on Earth," said Dr. Torrance California, "this lends weight to the supposition that he really is dead."

Galileo's ultimate destination is an orbit around Jupiter. But to get there, it needs to pick up extra speed; it has made one encounter with Venus and another with Earth. The spacecraft will swoop by Earth one more time in December 1992. The Galileo flyby was an opportunity to employ advanced planetary-science instruments to observe the Earth. During the encounter Galileo studied several aspects of the Earth-Moon system, which also served as a test of its instruments.

Having verified their search techniques in the Decmber 1990 encounter, scientists are now planning for the 1992 Earth flyby. At that time they expect to use Galileo to search for aviatrix Amelia Earhart and labor leader Jimmy Hoffa.

ATTENTION!! BERSERKER HAMFEST!!!

Todd found this item in the latest NUTS AND VOLTS:

The 1991 UPPER PENINSULA HAMFEST sponsored by the COPPER COUNTRY RADIO AMATEUR ASSOCIATION, will be held at Houghton County Arena, HANCOCK, MI. SATURDAY AUGUST 3rd, 1991! Vendors from several states will attend. Full tables are $5.00, Half tables are $3.00. For more information contact Howard D. Junkin, N8FHF, Copper Country Radio Amateur Assoc. PO Box 217, Dollar Bay, Mich., 49922.

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The Now & Then Newsletter of General Technics

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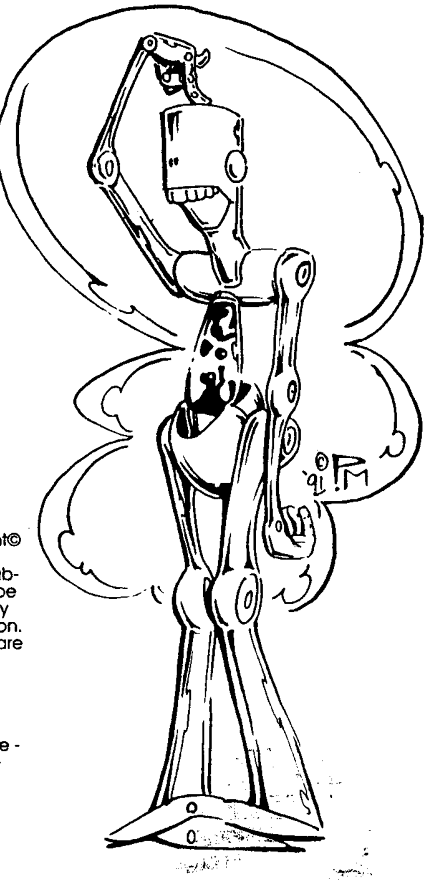

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Contributions of art can consist of cartoons, fillos, photos, etc. We prefer good black photocopies to original art.

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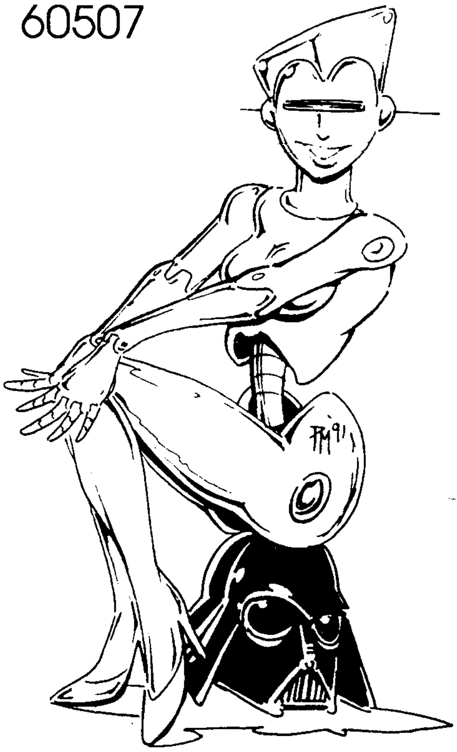

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